Mathematics Toolkit: Grade 6 Objective 5.B.1.b

Standard 5.0 Knowledge of Probability

Topic B. Theoretical Probability

Indicator 1. Determine the probability of one simple event comprised of equally likely outcomes

Objective b. Express the probability of an event as a decimal

Assessment Limits:

Use a sample space of 10, 20, 25, or 50 outcomes

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Clarification

Mathematics Grade 6 Objective 5.B.1.b Assessment Limit 1

Probability is the chance or likelihood of an event happening. Theoretical probability is the probability of an event occurring based on mathematical counting techniques. The outcomes are all the possible results of an activity that can occur. When rolling a number cube there are 6 possible numbers that can come up. There are 6 outcomes for rolling a number cube. An event is a specific set of outcomes, known as favorable outcomes, from the activity. When rolling a number cube there are 3 ways to roll an even number. Rolling an even number with a number cube is an event. An event composed of one single event is called a simple event.

Classroom Example 1

Marla has a box of chocolate-covered candies. Of the 20 pieces of candy in the box, 5 have caramel centers, 7 have fudge centers, and 3 have cherry centers. Maria picks one piece of candy without looking. What is the probability that it has a fudge center? Express your answer as a decimal.

Answer:

$$P(\text{event}) = \frac{\text{Number of favorable outcomes}}{\text{Number of possible outcomes}}$$

Since there are 20 different candies, there are 20 possible outcomes. Since there are 7 with fudge centers, there are 7 favorable outcomes. Therefore, the probability is:

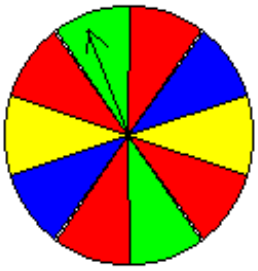
$$P(\text{fudge center}) = \frac{7}{20}$$

Since the question asks for the answer in decimal form the student must rewrite the fraction as a decimal:

$$\frac{7}{20} = 0.35$$

Classroom Example 2

The spinner below is divided into 10 equal sized sections.



What is the probability of spinning and landing on a red section? Express your answer as a percent.

Answer:

$$P(\text{event}) = \frac{\text{Number of favorable outcomes}}{\text{Number of possible outcomes}}$$

Since there are 10 different sections, there are 10 possible outcomes. Since there are 4 sections that are red, there are 4 favorable outcomes. Therefore, the probability is:

$$P(\text{red}) = \frac{4}{10}$$

Since the question asks for the answer as a percent, the student must rewrite the fraction as a percent:

$$\frac{4}{10} = 40\%$$

Sample Item #1 - Selected Response (SR) Item

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Reggie is bowling. In the last 50 throws of his bowling ball, Reggie makes a strike 18 times. Based on his last 50 throws, what is the experimental probability that Reggie will make a strike on his next throw?

A. 0.09
B. 0.18
C. 0.27
D. 0.36

Correct Answer:
D

Sample Item #2 - Selected Response (SR) Item

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Allison plays baseball. In the last 25 times at bat she made a hit 4 times. Based on her last 25 at bats, what is the experimental probability that Allison will make a hit on her next time at bat?

A. 0.04
B. 0.16
C. 0.25
D. 0.40

Correct Answer:
B

Answer Annotation

A. 0.04 (4 times at bat)
B. 0.16 (correct answer)
C. 0.25 (25 times at bat)
D. 0.40 (40 %)

Answer B: Based on the number of hits 4 out of the number of times at bat 25, the experimental probability she will make a hit on her next at bat is $\frac{4}{25} = 0.16$

Sample Item #3 - Selected Response (SR) Item

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A desk drawer contains 6 black pens, 5 blue pens, 4 red pens, and 5 green pens. Ron picks one pen from the drawer without looking. What is the probability Ron picks a blue pen?

A. 0.05
B. 0.10
C. 0.25
D. 0.50

Correct Answer:
C

Answer Annotation

A. 0.05 (5 blue pens)
B. 0.10 (10%)
C. 0.25 (Correct answer)
D. 0.50 (50 %)

Sample Item #4 - Brief Constructed Response (BCR) Item

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Amelia tossed a paper cup 10 times. The cup lands either on its side, on its base or on its top. The data below shows how the cup landed each time.

Base	Side	Side	Base	Side
Top	Side	Side	Side	Top

Step A

If Amanda tosses the cup now, what is the probability that it will land on its side? Express your answer as a decimal.

Step B

Explain how you determined your answer. Use what you know about probability in your explanation. Use words, numbers, and/or symbols in your explanation.

Answer Annotation

Step A Answer: 0.6

Step B Sample correct response: Since the cup landed on its side six out of ten times in the experiment, the probability that it will land on its side now is six out of ten. Six out of ten expressed as a decimal is 0.6.

Rubric - Brief Constructed Response (BCR)

Score 2
The response demonstrates a complete understanding and analysis of a problem.

- Application of a reasonable strategy in the context of the problem is indicated.
- Explanation[1] of and/or justification[2] for the mathematical process(es) used to solve a problem is clear, developed, and logical.
- Connections and/or extensions made within mathematics or outside of mathematics are clear.
- Supportive information and/or numbers are provided as appropriate. [3]

Score 1
The response demonstrates a minimal understanding and analysis of a problem.

- Partial application of a strategy in the context of the problem is indicated.
- Explanation[1] of and/or justification[2] for the mathematical process(es) used to solve a problem is partially developed, logically flawed, or missing.
- Connections and/or extensions made within mathematics or outside of mathematics are partial or overly general, or flawed.
- Supportive information and/or numbers may or may not be provided as appropriate.[3]

Score 0
The response is completely incorrect, irrelevant to the problem, or missing.[4]

Notes:

[1] Explanation refers to students' ability to communicate how they arrived at the solution for an item using the language of mathematics.

[2] Justification refers to students' ability to support the reasoning used to solve a problem, or to demonstrate why the solution is correct using mathematical concepts and principles.

[3] Students need to complete rubric criteria for *explanation, justification, connections* and/or *extensions* as cued for in a given problem.

[4] Merely an exact copy or paraphrase of the problem will receive a score of "0".

Rubric Document Date: August 2003